

## DATA AND DATA SOURCES FOR

### Changes in tobacco-related mortality due to reduced exposure products: a dynamic population model to estimate the potential efficacy of tobacco harm reduction approaches

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## 2. MODEL VALIDATION

Model designed to estimate and compare two life tables

- Life table of a potential reduced exposure product- (PREP) free population (i.e., the base case)
- Hypothetical life table of the same population had the PREP been available and used with a particular pattern of interest (i.e., the exposure scenario)

To validate the simulation model algorithms, we determined if, given appropriate model input, the life tables estimated by the model provided good approximations of actual population life tables

- Base case example: US men; compare model-based life table to the 2006 US life table for men (validation life table)
- Exposure scenario example: Swedish men; compare model-based life table to the 2006 Swedish life table for men (validation life table)
- Follow-up: from 12 to 72 years of age, 5-year age categories

## 3. CREATION OF VALIDATION LIFE TABLES

### 3.1 2006 US Life Table

Table 1: Life table based on age-specific all-cause mortality rates from the 2006 US life table for men (National Vital Statistics Reports, Vol. 58, No. 21, June 28, 2010), starting with 1,000,000 12 year olds

Age	Mortality rate	Survivors <sup>1</sup>	Model age categories	Estimated number of survivors at end of age category <sup>2</sup>
12	0.000136	1000000	<13	999932
13	0.000254	999864		
14	0.000418	999610		
15	0.000594	999192		
16	0.000759	998598		
17	0.000918	997840	13-17	997382
18	0.001063	996924		
19	0.001193	995864		
20	0.001329	994676		
21	0.001456	993354		
22	0.001536	991908	18-22	991146
23	0.001554	990384		
24	0.001526	988845		
25	0.001480	987336		
26	0.001443	985875		
27	0.001416	984452	23-27	983755
28	0.001408	983058		
29	0.001418	981674		
30	0.001437	980282		
31	0.001460	978873		
32	0.001500	977444	28-32	976711
33	0.001535	975978		
34	0.001589	974480		
35	0.001653	972932		
36	0.001737	971324		
37	0.001851	969637	33-37	968739.5
38	0.002001	967842		
39	0.002183	965905		
40	0.002381	963796		
41	0.002592	961501		
42	0.002827	959009	38-42	957653.5
43	0.003087	956298		
44	0.003369	953346		
45	0.003662	950134		
46	0.003970	946655		
47	0.004309	942897	43-47	940865.5

Table 1 cont.: Life table based on age-specific all-cause mortality rates from the 2006 US life table for men (National Vital Statistics Reports, Vol. 58, No. 21, June 28, 2010), starting with 1,000,000 12 year olds

Age	Mortality rate	Survivors <sup>1</sup>	Model age categories	Estimated number of survivors at end of age category <sup>2</sup>
48	0.004694	938834		
49	0.005125	934427		
50	0.005602	929638		
51	0.006107	924430		
52	0.006617	918785	48-52	915745
53	0.007104	912705		
54	0.007570	906221		
55	0.008042	899361		
56	0.008550	892128		
57	0.009114	884500	53-57	880469.5
58	0.009781	876439		
59	0.010582	867867		
60	0.011543	858683		
61	0.012632	848771		
62	0.013798	838049	58-62	832267.5
63	0.014946	826486		
64	0.016067	814133		
65	0.017272	801052		
66	0.018518	787216		
67	0.019974	772638	63-67	764921.5
68	0.021630	757205		
69	0.023559	740827		
70	0.025737	723374		
71	0.028223	704757		
72	0.031103	684867	67-72	674216.5
73	0.034372	663566		

<sup>1</sup> Survivors at a given age = Survivors at (age-1) × (1 – Mortality rate at (age-1))

Example: Survivors at age 13 = Survivors at age12 × (1 – mortality rate at age 12) = 1,000,000 × (1 - 0.00005) = 999,950

<sup>2</sup> Estimated number of survivors at end of age category = average number of survivors in last year of current age category and first year of subsequent age category; Example: Estimated number of survivors at end of age category 13-17 = (999,050 + 998,670) / 2 = 998,860

### 3.2 2006 Swedish Life Table

Table 2: Life table based on age-specific all-cause mortality rates from the 2006 Swedish life table for men (Statistics Sweden, Official Statistics of Sweden, Life tables for 2006), starting with 1,000,000 12 year olds

Age	Mortality rate	Survivors <sup>1</sup>	Model age categories	Estimated number of survivors at end of age category <sup>2</sup>
12	0.00005	1000000	<13	999975
13	0.00016	999950		
14	0.00012	999790		
15	0.00019	999670		
16	0.00043	999480		
17	0.00038	999050	13-17	998860
18	0.00040	998670		
19	0.00062	998271		
20	0.00060	997652		
21	0.00071	997053		
22	0.00063	996345	18-22	996031
23	0.00089	995717		
24	0.00055	994831		
25	0.00068	994284		
26	0.00053	993608		
27	0.00060	993081	23-27	992783
28	0.00051	992485		
29	0.00078	991979		
30	0.00055	991205		
31	0.00047	990660		
32	0.00054	990194	28-32	989926.5

Table 2 cont.: Life table based on age-specific all-cause mortality rates from the 2006 Swedish life table for men (Statistics Sweden, Official Statistics of Sweden, Life tables for 2006), starting with 1,000,000 12 year olds

Age	Mortality rate	Survivors <sup>1</sup>	Model age categories	Estimated number of survivors at end of age category <sup>2</sup>
33	0.00088	989659		
34	0.00050	988788		
35	0.00064	988294		
36	0.00087	987661		
37	0.00090	986802	33-37	986358
38	0.00086	985914		
39	0.00113	985066		
40	0.00092	983953		
41	0.00132	983048		
42	0.00153	981750	38-42	980999
43	0.00131	980248		
44	0.00155	978964		
45	0.00159	977447		
46	0.00200	975893		
47	0.00216	973941	43-47	972889
48	0.00207	971837		
49	0.00242	969825		
50	0.00287	967478		
51	0.00329	964701		
52	0.00363	961527	48-52	959782
53	0.00460	958037		
54	0.00451	953630		
55	0.00481	949329		
56	0.00534	944763		
57	0.00613	939718	53-57	936838
58	0.00582	933958		
59	0.00710	928522		
60	0.00768	921929		
61	0.00887	914849		
62	0.00914	906734	58-62	902590
63	0.01056	898446		
64	0.01140	888958		
65	0.01407	878824		
66	0.01533	866459		
67	0.01475	853176	63-67	846884
68	0.01653	840592		
69	0.01870	826697		
70	0.02191	811238		
71	0.02406	793464		
72	0.02608	774373	67-72	764275
73	0.02871	754177		

<sup>1</sup> Survivors at a given age = Survivors at (age-1) × (1 – Mortality rate at (age-1))

<sup>2</sup> Estimated number of survivors at end of age category = average number of survivors in last year of current age category and first year of subsequent age category

## 4. CREATION OF MODEL-BASED LIFE TABLES

### 4.1 Estimation of mortality rates

#### 4.1.1 Base case: Example of a PREP-free population – US men

- We used published data for men in the Kaiser Permanente (KP) cohort study (Friedman et al., 1997)
  - KP Data are based on a cohort of 60,000 men and women aged 35 and older who entered the cohort between 1979 and 1986 and were followed for mortality through 1987
  - KP Data consist of person-years and deaths stratified by categories of age and years of smoking and by categories of age and years since quitting

- A Poisson model containing the variables age, age<sup>2</sup>, years of cigarette smoking (y<sub>cs</sub>) and years since quitting cigarette smoking (y<sub>qcs</sub>) was used to estimate mortality rates based on the KP data
  - Never smokers:  $r_{ns} = \exp(\beta_0 + \beta_{age} \times age + \beta_{age2} \times age^2)$
  - Current smokers (never used a PREP):  $r_{cs} = \exp(\beta_0 + \beta_{age} \times age + \beta_{age2} \times age^2 + \beta_{cs} \times y_{cs})$
  - Former smokers (never used a PREP):  $r_{csfs} = \exp(\beta_0 + \beta_{age} \times age + \beta_{age2} \times age^2 + \beta_{cs} \times y_{cs} + \beta_{csfs} \times y_{qcs})$

The KP data could not be used directly in the model; the following changes were necessary:

- Table 4 shows the KP data by age and “years of smoking” category as published by Friedman et al.; two categories were highly unlikely to be observed in practice resulting in very few person-years and no deaths; we deleted both categories (see footnotes in table 4)
- Table 5 shows the KP data by age and “years since quitting” category as published by Friedman et al.; we adjusted inconsistencies in two categories (see footnotes in table 5)
- The KP data shown in table 4 had very wide age and “years of smoking” categories
  - We divided each of the first two age categories into two subcategories along the respective category midpoints (table 6)
  - Within each age category, we divided the first two “years of smoking” categories into two subcategories along the respective category midpoints
  - With few exceptions (see footnotes in table 6), we evenly divided person-years between the two new subcategories but divided deaths 40:60 between the younger and older subcategories and between the shorter and longer “years of smoking” subcategories
- The KP data shown in table 5 had very wide age categories
  - We divided each of the first two age categories into two subcategories along the respective category midpoints (table 7)
  - With one exception (see footnote in table 7), we evenly divided person-years between the two new subcategories but divided deaths 40:60 between the younger and older subcategories
- The KP data were not stratified by age-, years of smoking- and years since quitting
  - To obtain categories stratified by age-, years of smoking- and years of quitting (table 8), we first excluded hypothetical category combinations that were likely to contain very few person-years or were impossible (crossed out categories in table 8); for example, a person who had smoked for 40+ years and had quit for more than 20 years could not be in the youngest age category
  - Within each remaining age and “years since quitting” category, at most two “years of smoking” categories were likely or possible. If only one “years of smoking” category was possible, all deaths and person-years were counted toward that category. Otherwise, we split person-years 50:50 and split deaths 40:60 between the two “years of smoking” categories with more deaths among men with longer smoking duration.
  - Within each remaining “years of smoking”/“years since quitting” category, at most two age categories were likely or possible. If only one age category was possible, all deaths and person-years were counted toward that category. Otherwise, we split person-years 50:50 and split deaths 40:60 between the two age categories with more deaths among older men.
  - For age, “years of smoking” and “years since quitting” categories with an upper bound, we entered the category midpoints in the data set
  - For age category 75+, we entered 80 in the data set for the following reason: In 2006 the life expectancy for US men who had reached the age of 75 was 10 years; we used half that number as the category “midpoint”
  - “Years of smoking category” 40+ was not used for ages <57; for ages 57-64, we entered 45 in the data set; for ages 65-74 we used 50 years and for ages 75+ we used 55 years (older men are more likely to have smoked for considerably more than 40 years)
  - For “years since quitting” category >20 years, we used 26 years
- Follow-up in the KP cohort study was short and age-specific mortality rates were low compared to age-specific mortality rates in the US population (US Census 2000; [http://www.allcountries.org/uscensus/129\\_death\\_and\\_death\\_rates\\_by\\_age.html](http://www.allcountries.org/uscensus/129_death_and_death_rates_by_age.html))

- To adjust for this, we calculated the ratio of the US and KP-based mortality rates in each age category (table 9)
- Within each age category, we multiplied all smoking-specific deaths by the resulting factor
- Table 10 shows the final KP-based data set, which we used in the model to estimate the mortality rates for the base case

Table 4: KP-based age-specific person-years, deaths and mortality rates in never smokers and current smokers by duration of smoking – men

Age (years)	Cigarette smoking status	Years smoked	Person-years	Number of deaths	Mortality rate
35-49	Never	-	29,916	49	163.8
	Current	<20	5,940	16	269.4
	Current	20-39	14,563	48	329.6
50-64	Never	-	24,020	97	403.8
	Current	<20	1,174	7	596.3
	Current	20-39	10,205	80	783.9
	Current	40+	4,367	74	1694.5
65-74	Never	-	11,466	161	1404.2
	Current	<20 <sup>1</sup>	-	-	-
	Current	20-39	963	23	2388.4
	Current	40+	3,285	80	2435.3
75+	Never	-	4,486	203	4525.2
	Current	<20 <sup>2</sup>	-	-	-
	Current	20-39	138	12	8695.7
	Current	40+	740	42	5675.7

<sup>1</sup> Few men aged 65-74 will have smoked for <20 years; therefore, the category only contained 212 person-years and no deaths

<sup>2</sup> Few men aged 75+ will have smoked for <20 years; therefore, the category only contained 90 person-years and no deaths

Table 5: KP-based age-specific person-years, deaths and mortality rates in never smokers and former smokers by duration of quitting – men

Age (years)	Cigarette smoking status	Years quit	Person-years	Number of deaths	Mortality rate
35-49	Never	-	29,916	49	163.8
	Former	2-10	5,571	12	215.4
	Former	11-20	6,210	9 <sup>1</sup>	144.9
	Former	>20	1,149	2 <sup>2</sup>	174.1
50-64	Never	-	24,020	97	403.8
	Former	2-10	3,625	26	717.2
	Former	11-20	6,107	29	474.9
	Former	>20	4,670	19	406.9
65-74	Never	-	11,466	161	1404.2
	Former	2-10	977	14	1433.0
	Former	11-20	2,548	52	2040.8
	Former	>20	3,507	43	1226.1
75+	Never	-	4,486	203	4525.2
	Former	2-10	253	16	6324.1
	Former	11-20	671	40	5961.3
	Former	>20	1,442	67	4646.3

<sup>1</sup> Friedman et al. reported 5 deaths (mortality rate = 80.5). However, this rate among former smokers of 11-20 years is much lower than the mortality rate among never smokers in the same age category; we increased the number of deaths to 9.

<sup>2</sup> Friedman et al. reported 3 deaths (mortality rate = 261.1). However, this rate among former smokers of > 20 years is much higher than the mortality rate among former smokers of < 20 years in the same age category; we decreased the number of deaths to 2.

Table 6: KP-based age-specific all-cause person-years and deaths in never smokers and current smokers by duration of smoking – men (divided age and smoking categories)

Age (years)	Cigarette smoking status	Years smoked	Person-years	Number of deaths
35-42	Never	-	14,958.0	19.6
	Current	1-10 <sup>1</sup>	-	-
	Current	11-19 <sup>1</sup>	2,970.0	6.4
	Current	20-29 <sup>2</sup>	7,281.5	19.2
	Current	30-39 <sup>2</sup>	-	-
43-49	Never	-	14,958.0	29.4
	Current	1-10 <sup>1</sup>	-	-
	Current	11-19 <sup>1</sup>	2970.0	9.6
	Current	20-29 <sup>2</sup>	7,281.5	28.8
	Current	30-39 <sup>2</sup>	-	-
50-56	Never	-	12,010.0	38.8
	Current	1-10 <sup>4</sup>	-	-
	Current	11-19 <sup>3,4</sup>	1,174.0	7.0
	Current	20-29 <sup>5</sup>	5,102.5	32.0
	Current	30-39	2551.3	19.2
	Current	40+	-	-
57-64	Never	-	12,010.0	58.2
	Current	1-10 <sup>4</sup>	-	-
	Current	11-19 <sup>3,4</sup>	-	-
	Current	20-29 <sup>5</sup>	-	-
	Current	30-39	2551.3	28.8
	Current	40+	4,367.0	74.0
65-74	Never	-	11,466.0	161.0
	Current	1-10	-	-
	Current	11-19	-	-
	Current	20-29 <sup>6</sup>	-	-
	Current	30-39 <sup>6</sup>	963.0	23.0
	Current	40+	3,285.0	80.0
75+	Never	-	4,486.0	203.0
	Current	1-10	-	-
	Current	11-19	-	-
	Current	20-29 <sup>6</sup>	-	-
	Current	30-39 <sup>6</sup>	138.0	12.0
	Current	40+	740.0	42.0

<sup>1</sup> Person-years and deaths not divided between “years of smoking” categories 1-10 and 11-19; all assigned to “years of smoking” category 11-19 years because few 35-49 year old men will have smoked for 10 or fewer years

<sup>2</sup> Person-years and deaths not divided between “years of smoking” categories 20-29 and 30-39; all assigned to “years of smoking” category 20-29 years because few 35-49 year old men will have smoked for 30 or more years

<sup>3</sup> Person-years and deaths not divided between age categories 50-56 and 57-64; all assigned to age category 50-56 because few 57-64 year old men will have smoked for less than 20 years.

<sup>4</sup> Person-years and deaths not divided between “years of smoking” categories 1-10 and 11-19; all assigned to “years of smoking” category 11-19 years because few men aged 50-56 will have smoked for 10 or fewer years

<sup>5</sup> Person-years and deaths not divided between age categories 50-56 and 57-64; all assigned to age category 50-56 because few 57-64 year old men will have smoked for less than 30 years

<sup>6</sup> Person-years and deaths not divided between “years of smoking” categories 20-29 and 30-39; all assigned to “years of smoking” category 30-39 years because few men aged 65 or above will have smoked for only 20-29 years

Table 7: KP-based age-specific all-cause person-years and deaths in never smokers and former smokers by duration of quitting – men (divided age categories)

Age (years)	Cigarette smoking status	Years quit	Person-years	Number of deaths
35-42	Never	-	14,958.0	19.6
	Former	2-10	2,785.5	4.8
	Former	11-20	3,105.0	3.6
	Former	>20 <sup>1</sup>	-	-
43-49	Never	-	14,958.0	29.4
	Former	2-10	2,785.5	7.2
	Former	11-20	3,105.0	5.4
	Former	>20 <sup>1</sup>	1,149.0	2.0
50-56	Never	-	12,010.0	38.8
	Former	2-10	1,812.5	10.4
	Former	11-20	3,053.5	11.6
	Former	>20	2,335.0	7.6
57-64	Never	-	12,010.0	58.2
	Former	2-10	1,812.5	15.6
	Former	11-20	3,053.5	17.4
	Former	>20	2,335.0	11.4
65-74	Never	-	11,466.0	161.0
	Former	2-10	977.0	14.0
	Former	11-20	2,548.0	52.0
	Former	>20	3,507.0	43.0
75+	Never	-	4,486.0	203.0
	Former	2-10	253.0	16.0
	Former	11-20	671.0	40.0
	Former	>20	1,442.0	67.0

<sup>1</sup> Person-years and deaths not divided between age categories 35-42 and 43-49; all assigned to age category 43-49 because few 35-42 year old men will have quit for more than 20 years

Table 8: KP-based age-specific all-cause person-years and deaths in never smokers and current smokers by age, duration of smoking *and* duration of quitting – men (divided age and smoking categories)

Age (years)	Cigarette smoking status	Years smoked	Years quit	Person-years	Number of deaths
35-42	Never	-	-	14,958.0	19.6
	Current	1-10	-	-	-
	Former		2-10	1,392.8	1.9
	Former		11-20	3105.0	3.6
	Former		>20	-	-
	Current	11-19	-	2,970.0	6.4
	Former		2-10	1,392.8	2.9
	Former		11-20	-	-
	Former		>20	-	-
	Current	20-29	-	7,281.5	19.2
	Former		2-10	-	-
	Former		11-20	-	-
	Former		>20	-	-
	Current	30-39	-	-	-
	Former		2-10	-	-
	Former		11-20	-	-
	Former		>20	-	-



Table 8: KP-based age-specific all-cause person-years and deaths in never smokers and current smokers by age, duration of smoking and duration of quitting – men (divided age and smoking categories)

Age (years)	Cigarette smoking status	Years smoked	Years quit	Person-years	Number of deaths
43-49	Never	-	-	14,958.0	29.4
	Current	1-10	-	-	-
	Former		2-10	1,392.8	2.9
	Former		11-20	3,105.0	5.4
	Former		>20	1,149.0	2.0
	Current	11-19	-	2,970.0	9.6
	Former		2-10	1,392.8	4.3
	Former		11-20	-	-
	Former		>20	-	-
	Current	20-29	-	7,281.5	28.8
	Former		2-10	-	-
	Former		11-20	-	-
	Former		>20	-	-
	Current	30-39	-	-	-
	Former		2-10	-	-
	Former		11-20	-	-
	Former		>20	-	-
50-56	Never	-	-	12,010.0	38.8
	Current	1-10	-	-	-
	Former		2-10	-	-
	Former		11-20	-	-
	Former		>20	-	-
	Current	11-19	-	1,174.0	7.0
	Former		2-10	-	-
	Former		11-20	1,526.8	4.6
	Former		>20	2,335.0	7.6
	Current	20-29	-	5,102.5	32.0
	Former		2-10	906.3	4.2
	Former		11-20	1526.8	7.0
	Former		>20	-	-
	Current	30-39	-	2,551.3	19.2
	Former		2-10	906.3	6.2
	Former		11-20	-	-
	Former		>20	-	-
	Current	40+	-	-	-
	Former		2-10	-	-
	Former		11-20	-	-
	Former		>20	-	-
57-64	Never	-	-	12,010.0	58.2
	Current	1-10	-	-	-
	Former		2-10	-	-
	Former		11-20	-	-
	Former		>20	-	-
	Current	11-19	-	-	-
	Former		2-10	-	-
	Former		11-20	1,526.8	7.0
	Former		>20	2,335.0	11.4
	Current	20-29	-	-	-
	Former		2-10	906.3	6.2
	Former		11-20	1,526.8	10.4
	Former		>20	-	-
	Current	30-39	-	2551.3	28.8
	Former		2-10	906.3	9.4
	Former		11-20	-	-
	Former		>20	-	-
	Current	40+	-	4,367.0	74.0
	Former		2-10	-	-
	Former		11-20	-	-
	Former		>20	-	-

Table 8 cont.: KP-based age-specific all-cause person-years and deaths in never smokers and current smokers by age, duration of smoking and duration of quitting – men (divided age and smoking categories)

Age (years)	Cigarette smoking status	Years smoked	Years quit	Person-years	Number of deaths
65-74	Never	-	-	11,466.0	161.0
	Current	1-10	-	-	-
	Former	2-10	-	-	-
	Former	11-20	-	-	-
	Former	>20	-	-	-
	Current	11-19	-	-	-
	Former	2-10	-	-	-
	Former	11-20	-	-	-
	Former	>20	-	-	-
	Current	20-29	-	-	-
	Former	2-10	-	-	-
	Former	11-20	-	1,274.0	20.8
	Former	>20	-	3,507.0	43.0
	Current	30-39	-	963.0	23.0
	Former	2-10	-	977.0	14.0
	Former	11-20	-	1,274.0	31.2
	Former	>20	-	-	-
	Current	40+	-	3,285.0	80.0
	Former	2-10	-	-	-
	Former	11-20	-	-	-
	Former	>20	-	-	-
75+	Never	-	-	4,486.0	203.0
	Current	1-10	-	-	-
	Former	2-10	-	-	-
	Former	11-20	-	-	-
	Former	>20	-	-	-
	Current	11-19	-	-	-
	Former	2-10	-	-	-
	Former	11-20	-	-	-
	Former	>20	-	-	-
	Current	20-29	-	-	-
	Former	2-10	-	-	-
	Former	11-20	-	-	-
	Former	>20	-	-	-
	Current	30-39	-	138.0	12.0
	Former	2-10	-	-	-
	Former	11-20	-	335.5	16.0
	Former	>20	-	1,442.0	67.0
	Current	40+	-	740.0	42.0
	Former	2-10	-	253.0	16.0
	Former	11-20	-	335.5	24.0
	Former	>20	-	-	-

Table 9: US and KP-based age-specific mortality rates and their ratio

US		KP		US rates for KP age categories		Ratio of US mortality rates (for KP categories) to KP-based mortality rates
Age	Mortality rate (per 100,000)	Age	Mortality rate (per 100,000)	Age	Mortality rate (per 100,000)	
25-44	269.8					
		35-49	375.7	35-49	597.2 <sup>1</sup>	1.6
45-64	924.5	50-64	612.9	50-64	1,100.0 <sup>2</sup>	1.8
		65-74	1,639.8	65-74	2835.3 <sup>3</sup>	1.7
65+	5,670.6	75+	4,915.9	75+	5,670.6 <sup>4</sup>	1.2

<sup>1</sup> KP age category 35-49 overlaps with US age categories 25-44 and 45-64; we used the average of US mortality rates 269.8 and 924.5

<sup>2</sup> KP category 50-64 does not include ages 45-49, where mortality rates are lower; we increased the US mortality rate of 924.5 by ≈20%

<sup>3</sup> US category 65+ includes persons older than 74 with higher mortality rates; we used 50% of the US mortality rate of 5,670.6

<sup>4</sup> We used the US mortality rate of 5,670.6 for KP category 75+

Table 10: Data from table 8 with the number of deaths increased by 70% for ages <75 and by 20% for ages 75+ (based on table 9)

Age (years)	Cigarette smoking status	Years smoked	Years quit	Person-years	Number of deaths
<b>39.0</b>	Never	0	0	14,958.0	33.3
	Former	5	6	1,392.8	3.2
	Former	5	16	3,105.0	6.1
	Current	15	0	2,970.0	10.9
	Former	15	6	1,392.8	4.9
	Current	25	0	7,281.5	32.6
<b>46.5</b>	Never	0	0	14,958.0	50.0
	Former	5	6	1,392.8	4.9
	Former	5	16	3,105.0	9.2
	Former	5	26	1,149.0	3.4
	Current	15	0	2,970.0	16.3
	Former	15	6	1,392.8	7.3
	Current	25	0	7,281.5	49.0
<b>53.5</b>	Never	0	0	12,010.0	66.0
	Current	15	0	1,174.0	11.9
	Former	15	16	1,526.8	7.8
	Former	15	26	2,335.0	12.9
	Current	25	0	5,102.5	54.4
	Former	25	6	906.3	7.1
	Former	25	16	1,526.8	11.9
	Current	35	0	2,551.3	32.6
	Former	35	6	906.3	10.5
<b>61.0</b>	Never	0	0	12,010.0	98.9
	Former	15	16	1,526.8	11.9
	Former	15	26	2,335.0	19.4
	Former	25	6	906.3	10.5
	Former	25	16	1,526.8	17.7
	Current	35	0	2,551.3	49.0
	Former	35	6	906.3	16.0
	Current	45	0	4,367.0	125.8
<b>70.0</b>	Never	0	0	11,466.0	273.7
	Former	25	16	1,274.0	35.4
	Former	25	26	3,507.0	73.1
	Current	35	0	963.0	39.1
	Former	35	6	977.0	23.8
	Former	35	16	1,274.0	53.0
	Current	50	0	3,285.0	136.0
<b>80.0</b>	Never	0	0	4,486.0	243.6
	Current	35	0	138.0	14.4
	Former	35	16	335.5	19.2
	Former	35	26	1,442.0	80.4
	Current	55	0	740.0	50.4
	Former	55	6	253.0	19.2
	Former	55	16	335.5	28.8

#### 4.1.2 Exposure scenario: Example of a population with widespread PREP use - Swedish men

- We were unable to identify mortality data stratified by age and tobacco exposure category for Sweden
- We used the KP data as a first step to create a Swedish base case
  - The 2006 US life table for men very roughly matched the 1981 Swedish life table for men (compare tables 1 and 11)
  - Therefore, we used the 1981 Swedish life table for men (adjusted for differences between 2006 US and 1981 Swedish life table) as the base case

- Corresponding exposure scenario: *Hypothetical* 1981 Swedish life table for men (adjusted for differences between 2006 US and 1981 Swedish life table) under a different tobacco use pattern (more snus use, less cigarette smoking)
- Mortality rates for current snus users were estimated as follows:
  - Excess relative risk for current snus use vs. current cigarette smoking ( $ERR_{sncs}$ ) = 0.08 or 0.11 (Levy, 2004)
  - $r.sn = ERR_{sncs}(r.cs - r.ns) + r.ns$
$$[ERR_{sncs} = \frac{RR_{sn} - 1}{RR_{cs} - 1} \rightarrow RR_{sn} - 1 = ERR_{sncs}(RR_{cs} - 1) \rightarrow \frac{r.sn}{r.ns} - \frac{r.ns}{r.ns} = ERR_{sncs}(\frac{r.cs}{r.ns} - \frac{r.ns}{r.ns})$$

$$\rightarrow r.sn - r.ns = ERR_{sncs}(r.cs - r.ns) \rightarrow r.sn = ERR_{sncs}(r.cs - r.ns) + r.ns]$$
- Mortality rates for former snus users were estimated as follows:
  - Excess relative risk for former snus use vs. former cigarette smoking ( $ERR_{fsnfs}$ ) = 0.5 (our estimate)
  - $r.snfsn = ERR_{fsnfs}(r.csfs - r.ns) + r.ns$
- All other mortality rates were based on the mortality rates defined above

Table 11: Survivors based on age-specific all-cause mortality rates from the 1981 Swedish life table for men (From: Befolkningsförändringar 1981, Del 3. Hela riket och länen m m– Sveriges officiella statistik – Population Changes 1981, Part 3 – Official statistics of Sweden, Men: Statistiska centralbyrån, Stockholm 1982, 108-109), starting with 1,000,000 12 year olds

Age	Mortality rate	Survivors <sup>1</sup>	Model age categories	Estimated number of survivors at end of age category <sup>2</sup>
12	0.00019	1000000	<13	999905
13	0.00025	999810		
14	0.00037	999560		
15	0.00041	999190		
16	0.00044	998780		
17	0.00069	998341	13-17	997996.5
18	0.00097	997652		
19	0.00081	996684		
20	0.00116	995877		
21	0.00087	994722		
22	0.00105	993857	18-22	993335
23	0.00100	992813		
24	0.00093	991820		
25	0.00099	990898		
26	0.00086	989917		
27	0.00097	989066	23-27	988586.5
28	0.00113	988107		
29	0.00118	986990		
30	0.00123	985825		
31	0.00124	984612		
32	0.00109	983391	28-32	982855
33	0.00144	982319		
34	0.00113	980904		
35	0.00140	979796		
36	0.00140	978424		
37	0.00173	977054	33-37	976209
38	0.00176	975364		
39	0.00196	973647		
40	0.00210	971739		
41	0.00256	969698		
42	0.00280	967216	38-42	965862

Table 11 cont.: Survivors based on age-specific all-cause mortality rates from the 1981 Swedish life table for men (From: Befolkningsförändringar 1981, Del 3. Hela riket och länen m m– Sveriges officiella statistik – Population Changes 1981, Part 3 – Official statistics of Sweden, Men: Statistiska centralbyrån, Stockholm 1982, 108-109), starting with 1,000,000 12 year olds

Age	Mortality rate	Survivors <sup>1</sup>	Model age categories	Estimated number of survivors at end of age category <sup>2</sup>
43	0.00257	964508	43-47	950136
44	0.00310	962029		
45	0.00344	959047		
46	0.00381	955748		
47	0.00414	952107		
48	0.00428	948165	48-52	925378.5
49	0.00486	944107		
50	0.00528	939519		
51	0.00623	934558		
52	0.00723	928736		
53	0.00731	922021	53-57	886891.5
54	0.00788	915281		
55	0.00882	908069		
56	0.00938	900060		
57	0.01060	891617		
58	0.01100	882166	58-62	829132.5
59	0.01260	872462		
60	0.01411	861469		
61	0.01573	849314		
62	0.01632	835954		
63	0.01823	822311	63-67	742216
64	0.02141	807320		
65	0.02342	790035		
66	0.02416	771532		
67	0.02836	752892		
68	0.03073	731540	67-72	617100.5
69	0.03555	709060		
70	0.03606	683853		
71	0.04241	659193		
72	0.04479	631237		
73	0.05056	602964		

<sup>1</sup> Survivors at a given age = Survivors at (age-1) × (1 – Mortality rate at (age-1))

<sup>2</sup> Estimated number of survivors at end of age category = average number of survivors in last year of current age category and first year of subsequent age category

#### 4.2 Estimation of the transition probabilities

We used initiation and cessation rates from 1980 because it provided an induction period for initiation- and cessation-related deaths to have occurred by 2006

#### 4.2.1 Transition probabilities for the base case

##### Annual cigarette initiation rates per 100 person-years in 1980

From: Office of Applied Studies, National Household Survey on Drug Abuse (NHSDA), 1999, Appendix D, table 4.2  
 Since our age categories did not perfectly overlap with those used by NHSDA, we slightly adjusted the rates (table 12)

Table 12: Cigarette smoking initiation rates per 100 person-years, US 1980 (males and females, any race)

NHSDA age category	NHSDA initiation rate	Model age category	Corrected initiation rate	Correction and reason for correction
12-17	4.1	13-17	4.5	Increased initiation rate <ul style="list-style-type: none"> <li>12 year olds (lower initiation rates) are part of NHSDA age category but are not part of model age category</li> </ul>
18-24	3.6	18-22	4.0	Increased initiation rate <ul style="list-style-type: none"> <li>23 and 24 year olds (lower initiation rates) are part of NHSDA age category but are not part of model age category</li> </ul>
25+	≈0.5	23-27	0.5	No change
		28-32	0.1	Used initiation rate of 0.1
		Above 32	0.0	At these ages practically no smoking initiation takes place

To estimate initiation rates over 5-year periods, we multiplied each rate by 2.5, the average person-time at risk of smoking initiation in each 5-year age category.

##### Annual cigarette cessation rates per 100 person-years in 1980

From: Messer et al., 2007 (figure 2)

Since our age categories did not perfectly overlap with those used by Messer et al., we adjusted the rates (table 13)

Table 13: Cigarette smoking cessation (%), US 1980 (white males and females)

Messer et al. age category	Messer et al. cessation (%)	Our age category	Corrected cessation (%)	Correction and reason for correction
		13-17	1.0	Presumably less cessation in youngest age group
20-34	1.8	18-22 23-27 28-32	1.8 1.8 1.8	No change; model age category included in Messer et al. category
		33-37	2.0	
				Weighted average of 1.8 and 2.2 (rounded to nearest integer)
35-49	2.2	38-42 43-47	2.2 2.2	No change; model age category included in Messer et al. category
		48-52	3.0	
				Weighted average of 2.2 and 3.4 (rounded to nearest integer)
50-64	3.4	53-57 58-62 63-67 68-72	3.4 3.4 3.4 3.4	No change; model age category included in Messer et al. category

To estimate initiation rates over a 5-year period, we multiplied each rate by 2.5, the average person-time at risk of smoking cessation in each 5-year age category.

#### 4.2.2 Transition probabilities for the exposure scenario

- Figure 1 shows all transitions incorporated in the model
- The probabilities are explained below

$\pi_{i1}$  = **proportion of never smokers that remain never smokers (in the absence of snus)**

$\pi_{i2}$  = proportion of  $\pi_{i1}$  that remain never smokers in the presence of snus

$(1-\pi_{i2})$  = proportion of  $\pi_{i1}$  that become snus users in the presence of snus

$\pi_{i4}$  = proportion of  $(1-\pi_{i2})$  that that switch to smoking

$\pi_{i7}$  = proportion of  $\pi_{i4}$  that continue smoking

$\pi_{i8}$  = proportion of  $\pi_{i4}$  that switch to snus

$\pi_{i10}$  = proportion of  $\pi_{i8}$  that continue snus

$1-\pi_{i10}$  = proportion of  $\pi_{i8}$  that quit snus

$1-(\pi_{i7} + \pi_{i8})$  = proportion of  $\pi_{i4}$  that quit smoking

$\pi_{i5}$  = proportion of  $(1-\pi_{i2})$  that that continue snus *and* start smoking

$\pi_{i9}$  = proportion of  $\pi_{i5}$  that continue dual use

$1-\pi_{i9}$  = proportion of  $\pi_{i5}$  that quit all tobacco use

$\pi_{i6}$  = proportion of  $(1-\pi_{i2})$  that continue snus

$1-(\pi_{i4} + \pi_{i5} + \pi_{i6})$  = proportion of  $(1-\pi_{i2})$  that that quit snus

$\pi_{i11}$  = proportion of  $1-(\pi_{i4} + \pi_{i5} + \pi_{i6})$  that re-start snus

$\pi_{i12}$  = proportion of  $\pi_{i11}$  that continue snus

$1-\pi_{i12}$  = proportion of  $\pi_{i11}$  that quit snus

$1-\pi_{i11}$  = proportion of  $1-(\pi_{i4} + \pi_{i5} + \pi_{i6})$  that remain former snus users

**$(1-\pi_{i1})$  = proportion of never smokers that become smokers (in the absence of snus)**

$\pi_{i3}$  = proportion of  **$(1-\pi_{i1})$**  that still become smokers in the presence of snus

$(1-\pi_{i3})$  = proportion of  **$(1-\pi_{i1})$**  that become snus users in the presence of snus

$\pi_{i4}$  = proportion of  $(1-\pi_{i3})$  that that switch to smoking

$\pi_{i7}$  = proportion of  $\pi_{i4}$  that continue smoking

$\pi_{i8}$  = proportion of  $\pi_{i4}$  that switch to snus

$\pi_{i10}$  = proportion of  $\pi_{i8}$  that continue snus

$1-\pi_{i10}$  = proportion of  $\pi_{i8}$  that quit snus

$1-(\pi_{i7} + \pi_{i8})$  = proportion of  $\pi_{i4}$  that quit smoking

$\pi_{i5}$  = proportion of  $(1-\pi_{i3})$  that that continue snus *and* start smoking

$\pi_{i9}$  = proportion of  $\pi_{i5}$  that continue dual use

$1-\pi_{i9}$  = proportion of  $\pi_{i5}$  that quit all tobacco use

$\pi_{i6}$  = proportion of  $(1-\pi_{i3})$  that continue snus

$1-(\pi_{i4} + \pi_{i5} + \pi_{i6})$  = proportion of  $(1-\pi_{i3})$  that that quit snus

$\pi_{i11}$  = proportion of  $1-(\pi_{i4} + \pi_{i5} + \pi_{i6})$  that re-start snus

$\pi_{i12}$  = proportion of  $\pi_{i11}$  that continue snus

$1-\pi_{i12}$  = proportion of  $\pi_{i11}$  that quit snus

$1-\pi_{i11}$  = proportion of  $1-(\pi_{i4} + \pi_{i5} + \pi_{i6})$  that remain former snus users

**$\pi_{i13}$  = proportion of smokers that remain smokers (in the absence of snus)**

$\pi_{i14}$  = proportion of  $\pi_{i13}$  that still remain smokers in the presence of snus

$\pi_{i15}$  = proportion of  $\pi_{i13}$  that switch to snus in the presence of snus

$\pi_{i17}$  = proportion of  $\pi_{i15}$  that that switch to smoking  
 $\pi_{i20}$  = proportion of  $\pi_{i17}$  that continue smoking  
 $1-\pi_{i20}$  = proportion of  $\pi_{i17}$  that quit smoking  
 $\pi_{i18}$  = proportion of  $\pi_{i15}$  that continue snus  
 $1-(\pi_{i17}+\pi_{i18})$  = proportion of  $\pi_{i15}$  that quit snus  
  
 $1-(\pi_{i14}+\pi_{i15})$  = proportion of  $\pi_{i13}$  that become dual users in the presence of snus

**( $1-\pi_{i13}$ ) = proportion smokers that quit smoking (in the absence of snus)**

$\pi_{i16}$  = proportion of ( $1-\pi_{i13}$ ) that still quit in the presence of snus

$\pi_{i21}$  = proportion of  $\pi_{i6}$  that re-start smoking  
 $\pi_{i22}$  = proportion of  $\pi_{i21}$  that continue smoking  
 $1-\pi_{i22}$  = proportion of  $1-\pi_{i21}$  that quit smoking  
 $1-\pi_{i21}$  = proportion of  $\pi_{i6}$  that remain former smokers

( $1-\pi_{i16}$ ) = proportion of ( $1-\pi_{i13}$ ) that switch to snus in the presence of snus

$\pi_{i17}$  = proportion of ( $1-\pi_{i6}$ ) that that switch to smoking  
 $\pi_{i20}$  = proportion of  $\pi_{i17}$  that continue smoking  
 $1-\pi_{i20}$  = proportion of  $\pi_{i17}$  that quit smoking  
 $\pi_{i18}$  = proportion of ( $1-\pi_{i6}$ ) that continue snus  
 $1-(\pi_{i17}+\pi_{i18})$  = proportion of ( $1-\pi_{i6}$ ) that quit snus

- Tables 14 a and b show the transition probabilities corresponding to figure 1 that were used in the validation exercise
- For transitions not involving snus use ( $\pi_1$  and  $\pi_{13}$ ), we used the base case transition probabilities described above
- For transitions involving snus use and following 0 or 1 prior transition ( $\pi_2 - \pi_6, \pi_9, \pi_{14} - \pi_{19}, \pi_{21}$ ), we based the transition probabilities on Swedish data published by Lundqvist et al. (2009) for 10-year follow-up periods between 1990 and 2004; we made some changes to the Lundqvist et al. transition probabilities which are described below
- For transitions following 2 or 3 prior transitions ( $\pi_7, \pi_8, \pi_{10} - \pi_{12}, \pi_{20}, \pi_{22}$ ), we assumed that the probability of a change in exposure status was 5% while the probability of not making a change was 95%; when two changes in exposure status were possible (e.g. quitting a product and switching to another product), the probability for each was 2.5%
- For ages 33 and older, we allowed no new cigarette smoking or snus initiation because it is extremely unlikely to occur at these ages
- Otherwise, for simplicity, for transitions involving snus, we used the same transition probabilities for all age categories



Table 14a: Transition probabilities for men who do not initiate any tobacco use or whose first tobacco exposure was snus

Age category	$\pi_1$	$\pi_2$	$\pi_3$	$\pi_4$	$\pi_5$	$\pi_6$	$\pi_7$	$\pi_8$	$\pi_9$	$\pi_{10}$	$\pi_{11}$	$\pi_{12}$
13-17	0.8875	0.95	0.95	0.01	0.03	0.77	0.95	0.025	0.3	0.95	0.05	0.95
18-22	0.9000	0.95	0.95	0.01	0.03	0.77	0.95	0.025	0.3	0.95	0.05	0.95
23-27	0.9875	0.95	0.95	0.01	0.03	0.77	0.95	0.025	0.3	0.95	0.05	0.95
28-32	0.9975	0.95	0.95	0.01	0.03	0.77	0.95	0.025	0.3	0.95	0.05	0.95
33-37	1.0000	1.00	-	-	-	-	-	-	-	-	-	-
38-42	1.0000	1.00	-	-	-	-	-	-	-	-	-	-
43-47	1.0000	1.00	-	-	-	-	-	-	-	-	-	-
48-52	1.0000	1.00	-	-	-	-	-	-	-	-	-	-
53-57	1.0000	1.00	-	-	-	-	-	-	-	-	-	-
58-62	1.0000	1.00	-	-	-	-	-	-	-	-	-	-
63-67	1.0000	1.00	-	-	-	-	-	-	-	-	-	-
68-72	1.0000	1.00	-	-	-	-	-	-	-	-	-	-

Table 14b: Transition probabilities for men whose first tobacco exposure was cigarettes

Age category	$\pi_{13}$	$\pi_{14}$	$\pi_{15}$	$\pi_{16}$	$\pi_{17}$	$\pi_{18}$	$\pi_{19}$	$\pi_{20}$	$\pi_{21}$	$\pi_{22}$
13-17	0.975	0.9	0.05	0.98	0.015	0.768	0.3	0.95	0.045	0.95
18-22	0.955	0.9	0.05	0.98	0.015	0.768	0.3	0.95	0.045	0.95
23-27	0.955	0.9	0.05	0.98	0.015	0.768	0.3	0.95	0.045	0.95
28-32	0.955	0.9	0.05	0.98	0.015	0.768	0.3	0.95	0.045	0.95
33-37	0.950	0.9	0.05	0.98	0.015	0.768	0.3	0.95	0.045	0.95
38-42	0.945	0.9	0.05	0.98	0.015	0.768	0.3	0.95	0.045	0.95
43-47	0.945	0.9	0.05	0.98	0.015	0.768	0.3	0.95	0.045	0.95
48-52	0.925	0.9	0.05	0.98	0.015	0.768	0.3	0.95	0.045	0.95
53-57	0.915	0.9	0.05	0.98	0.015	0.768	0.3	0.95	0.045	0.95
58-62	0.915	0.9	0.05	0.98	0.015	0.768	0.3	0.95	0.045	0.95
63-67	0.915	0.9	0.05	0.98	0.015	0.768	0.3	0.95	0.045	0.95
68-72	0.915	0.9	0.05	0.98	0.015	0.768	0.3	0.95	0.045	0.95

- The Swedish transition probabilities published by Lundqvist et al. (2009) for 10-year follow-up periods between 1990 and 2004 and the corresponding transitions from our model are shown in table 15
- The follow-up periods used by Lundqvist et al. likely excluded at least part of the exposure window of interest for mortality in 2006
- Swedish prevalence data suggested that the cigarette smoking prevalence decreased by about 25 percentage points while the snus use prevalence increased by just over 10 percentage points between 1976 and 2002 (Foulds et al., 2003)
- Accordingly, we increased the Lundqvist-based probability of continued cigarette smoking and decreased the Lundqvist-based probability of switching to snus; for the probabilities to add to 100%, the probability of quitting and the probability of initiating dual use also had to be changed (footnotes 1-4 in table 15)

Table 15: Transition probabilities based on Swedish data published by Lundqvist et al. (2009) for 10-year follow-up periods between 1990 and 2004 and corresponding transitions in figure 1  
(NT=never tobacco use; CS=cigarette smoking; SN = snus use; DU=dual use; FS=former cigarette smoking; FSN=former snus use; FDU=former dual use)

Transitions modeled by Lundqvist et al.			Transition probabilities (Lundqvist et al.)	Corresponding transitions in figure 1	Transition probabilities corresponding to Lundqvist et al. <sup>#</sup>
From	To	Then to			
CS	FS	-	$\approx 0.10^1$	$(1-\pi_{13})^* \pi_{16}$	0.074
	SN	-	$\approx 0.04^2$	$\pi_{13}^* \pi_{15} + (1-\pi_{13})^*(1-\pi_{16})$	0.048
	CS	-	$\approx 0.80^3$	$\pi_{13}^* \pi_{14}$	0.833
	DU	-	$\approx 0.06^4$	$\pi_{13}^*(1-(\pi_{14}+\pi_{15}))$	0.046
SN	FSN	-	0.185	$1-(\pi_4+\pi_5+\pi_6)$	0.190
	SN	-	0.773	$\pi_6$	0.770
	CS	-	0.010	$\pi_4$	0.010
	DU	-	0.031	$\pi_5$	0.030
CS	SN	FSN	0.183	$1-(\pi_{17}+\pi_{18})$	0.217
		SN	0.768	$\pi_{18}$	0.768
		CS	0.015	$\pi_{17}$	0.015
		DU	0.035	-	-
DU	FDU	-	0.124	$(1-\pi_9)$ and $(1-\pi_{19})$	0.700
	SN	-	0.462	-	-
	CS	-	0.086	-	-
	DU	-	0.328	$\pi_9$ and $\pi_{19}$	0.300
NT	NT	-	0.939	$\pi_1^* \pi_2$	0.931
	SN	-	0.046	$\pi_1^*(1-\pi_2)+(1-\pi_1)^*(1-\pi_3)$	0.050
	CS	-	0.012	$(1-\pi_1)^* \pi_3$	0.019
	DU	-	0.002	-	-
CS	FS	FS	0.864	$1-\pi_{21}$	0.955
		SN	0.084	-	-
		CS	0.045	$\pi_{21}$	0.045
		DU	0.008	-	-

<sup>#</sup>Transition probabilities obtained by plugging the appropriate values from tables 14 a and b into the formulas under "corresponding transitions in figure 1"; used 0.98 for  $\pi_1$  and 0.925 for  $\pi_{13}$

<sup>1</sup> Lundqvist-based probability of quitting cigarette smoking =0.259; decreased by approximately 15 percentage points to 0.10

<sup>2</sup> Lundqvist-based probability of continued cigarette smoking =0.136; decreased by approximately 10 percentage points to 0.04

<sup>3</sup> Lundqvist-based probability of continued cigarette smoking =0.531; increased by approximately 25 percentage points to 0.80

<sup>4</sup> Lundqvist-based probability of initiating dual use=0.074; decreased by approximately 1 percentage point to 0.06

### 4.3 Variability estimates

- For the prior distributions of the core Poisson model coefficients, we used non-informative normal distributions with mean 0 and standard deviation 100
- For the prior distribution of all smoking initiation and cessation rates, we used normal distributions with mean equal to the estimated rate and standard deviation equal to 1% (but bounded between 0 and 100%)
- We assumed that the natural log of the ERRs of snus users vs. smokers and former snus users vs. former smokers were normally distributed with means 0.08 and 0.5, respectively. The standard deviations were assumed to be 100

### 4.4 Model iterations

We used 10,000 iterations after a burn-in of 2000 iterations and considered a Markov chain to have converged if the Monte Carlo error was less than 5% of the sample standard deviation.

## 5. CALCULATION OF THE FULL MODEL VALIDATION RESULTS

- The base case reflected an approximation of the 1981 Swedish life table for men and therefore, using the transition probabilities described above, the full model results reflected an approximation of the *hypothetical* 1981 Swedish life table for men under a different tobacco use pattern (more snus use, less cigarette smoking)
- To validate the full model, the results had to be comparable to an *actual* life table (we chose the 2006 life table for Swedish men)
- We could not directly compare the full model results for 1981 to the 2006 Swedish life table because
  - The 2006 US life table only roughly approximated the 1981 Swedish life table (table 16, column 1)
  - The age-specific numbers of survivors increased between 1981 and 2006 due to tobacco related and non-tobacco related risk factors (table 16, column 2)
  - In both years, among Swedish men aged 35-69 years, approximately 85% of deaths (all causes) were attributable to risk factors other than smoking (Peto et al., 2006)
  - We adjusted all age-specific full model results by adding an “adjustment term” (85% of the background change in mortality plus the differences between the 1981 Swedish life table and the 2006 US life table; table 16, column 3)

Table 16: Age-specific differences between the number of survivors in the 1981 Swedish life table and the 2006 US life table, age-specific differences between the number of survivors in the 2006 and 1981 Swedish life tables, and adjustment term

Age category	Differences between 1981 Swedish life table and 2006 US life table	Differences between 2006 and 1981 Swedish life table	Adjustment term <sup>1</sup>
38-42	8208	15,137	21,074
43-47	9270	22,753	28,610
48-52	9,633	34,403	38,876
53-57	6,423	49,946	48,877
58-62	-3,134	73,457	59,304
63-67	-22,706	104,668	66,262
68-72	-57,116	147,174	67,982

<sup>1</sup> Adjustment term = 85% of background change in mortality (1981 to 2006) + difference between 1981 Swedish and 2006 US life table  
 = 0.85 × (difference between 2006 and 1981 Swedish life tables)  
 + difference between 1981 Swedish and 2006 US life table

(All results are shown in Swedish Life Table.xlsx)

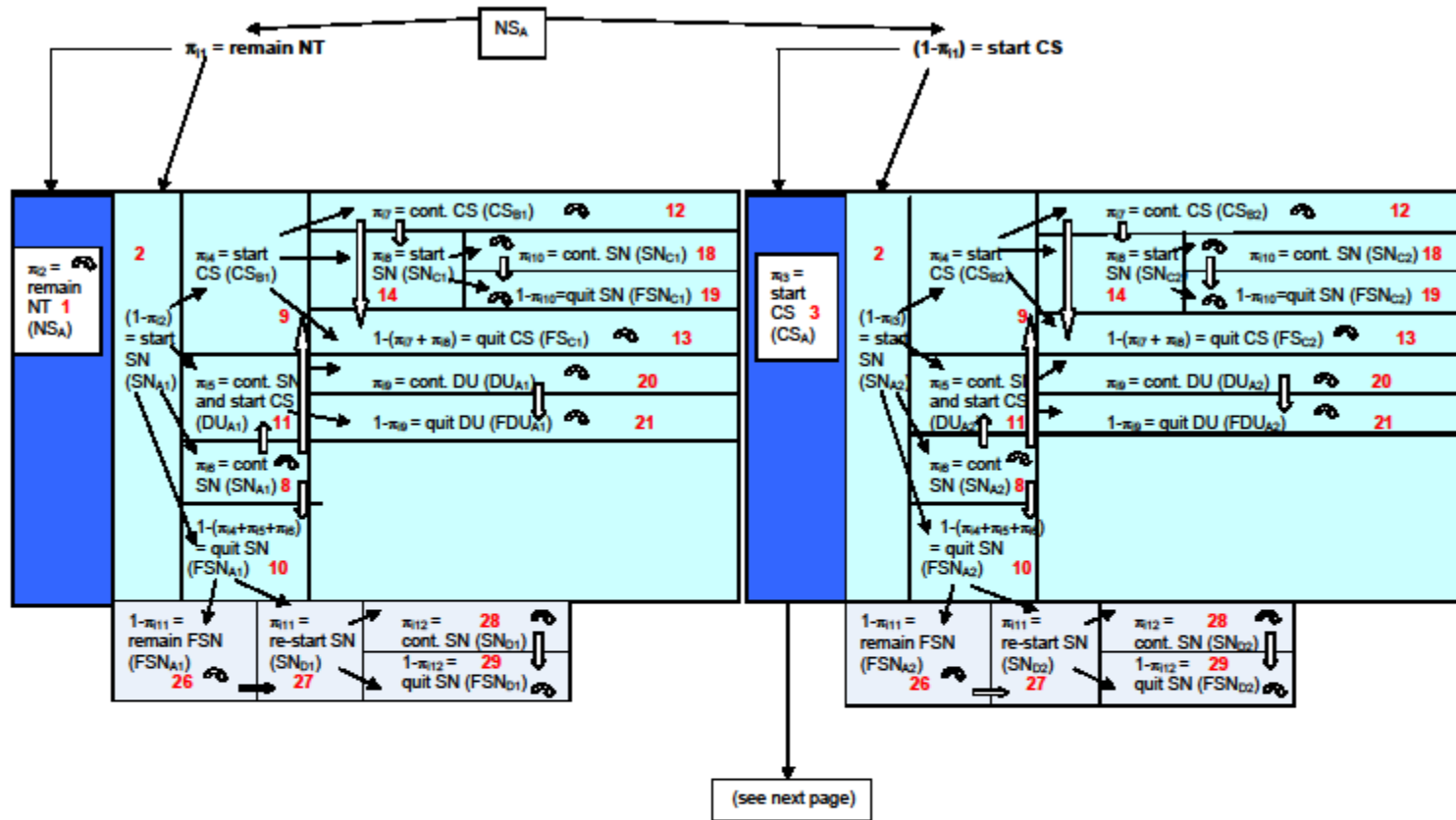


Figure 1: Possible transitions between exposure states

(Red numbers = transition numbers)

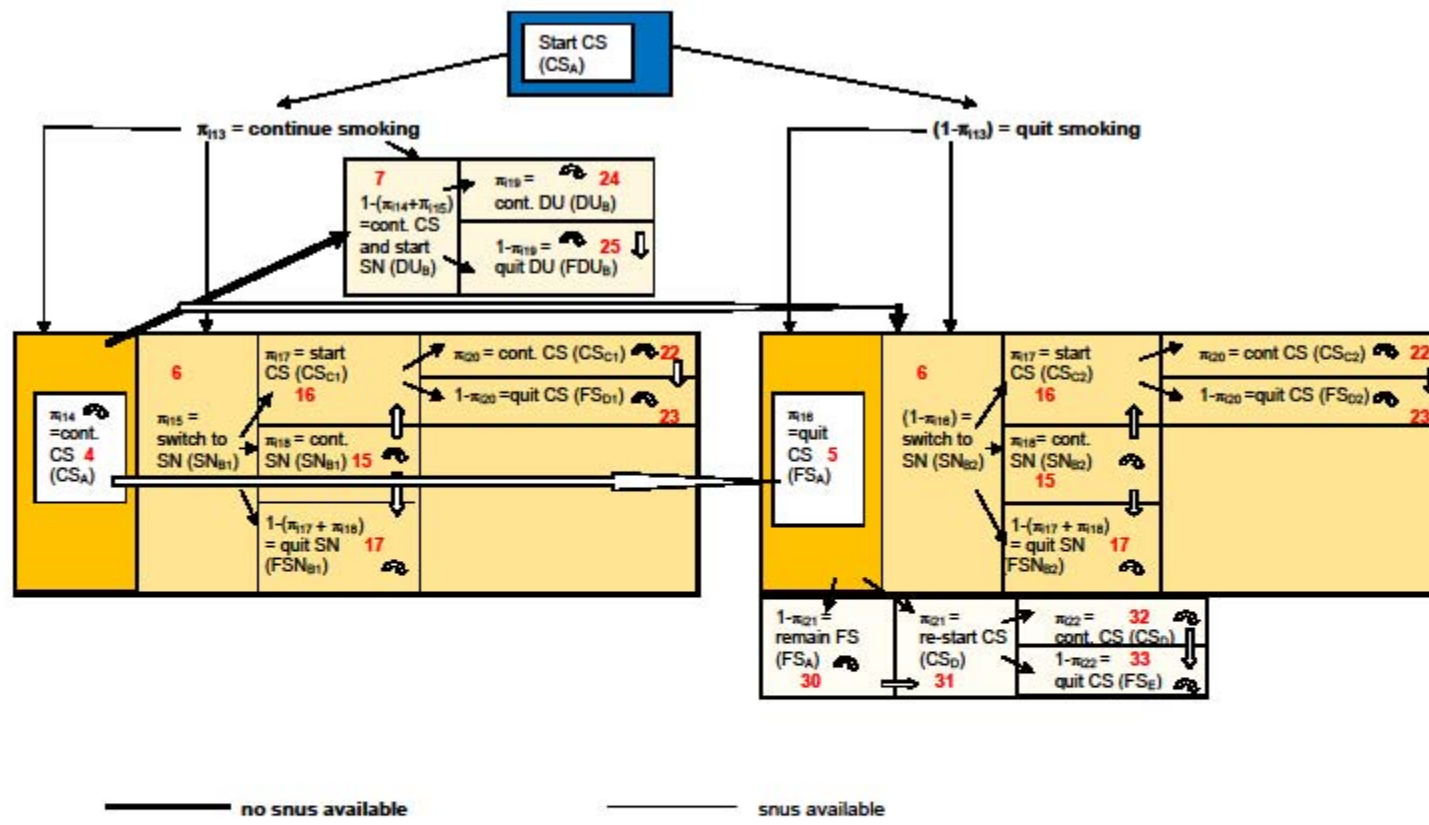


Figure 1: Possible transitions between exposure states (cont.)

(Red numbers = transition numbers)

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Peto R, Lopez AD, et al. 2006. Mortality from smoking in developed countries 1950-2000. 2<sup>nd</sup> ed, revised June 2006: [www.deathsfromsmoking.net](http://www.deathsfromsmoking.net). Sweden.